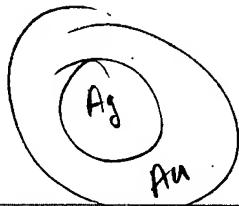


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(54) TRANSPARENT CONDUCTIVE BASE MATERIAL, ITS MANUFACTURE, PAINT LIQUID FOR FORMING TRANSPARENT CONDUCTIVE LAYER USED FOR MANUFACTURING IT, AND ITS MANUFACTURE

(57) Abstract:

PROBLEM TO BE SOLVED: To provide a transparent conductive base material and paint liquid for forming a transparent conductive layer excellent in weather resistance, ultraviolet resistance and conductivity, and manufacturing methods for them capable of reducing their manufacturing costs.

SOLUTION: This transparent conductive base material is equipped with a transparent base, and a transparent conductive layer and a transparent coat layer formed in order on the transparent base, and the transparent conductive layer is made of gold and/or platinum and silver, and has a noble metal particulate with an average particle diameter of 1-100 nm containing gold and/or platinum in a range from a weight percentage exceeding 50 wt.% to 95 wt.% and a binder matrix as main ingredients. Liquid paint for forming a transparent conductive layer has a solvent and a silver particulate dispersed in the solvent and coated with noble metal as main ingredients, and the surface of the silver particulate is coated with

gold, a platinum simplex or a complex of gold and platinum, while it has an average particle diameter of 1-100 nm and contains gold and/or platinum in a range from a weight percentage exceeding 50 wt.% to 95 wt.%.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]**[0001]**

[Field of the Invention] This invention relates to the transparent conductive base material which is equipped with the transparency conductive layer and transparency coat layer by which sequential formation was carried out a transparency substrate and on this, for example, is applied to the front plate of displays, such as CRT, etc., and relates to the coating liquid for transparency conductive layer formation used for manufacture of the transparent conductive base material which is excellent in weatherability, ultraviolet resistance, conductivity, etc., and can moreover aim at reduction of a manufacturing cost especially, its manufacture approach, and a transparent conductive base material, and its manufacture approach.

[0002]

[Description of the Prior Art] The environment where many OA equipment must be introduced into office by office automation(OA)-ization in recent years, the display of OA equipment must be faced, and a last date activity must be done is not new recently.

[0003] By the way, when working in contact with the cathode-ray tube (CRT) of a computer etc. as an example of OA equipment, the display screen is legible and it is required that there are no adhesion of dust and electric shock shock by electrification of a CRT front face out of not impressing visual fatigue etc. Furthermore, in addition to this etc., we are anxious about the bad influence to the body of a low frequency electromagnetic wave generated from CRT, and, recently, such an electromagnetic wave is wanted not to be revealed outside to CRT.

[0004] And it generates from a deflecting coil or a flyback transformer, and the above-mentioned electromagnetic wave has a lot of electromagnetic waves in the inclination revealed to a perimeter increasingly with enlargement of television.

[0005] By the way, leakage of a field can prevent most with the device of changing the configuration of a deflecting coil. It is possible to also prevent leakage of electric field on the other hand by forming a transparency conductive layer in the front-windshield front face of CRT.

[0006] The prevention approach for leakage of such electric field is the same in recent years on the cure and principle target which have been taken for electrification prevention. however, the above-mentioned transparency conductive layer -- antistatic -- conductivity far higher than the conductive layer currently formed in business is searched for. namely, antistatic -- business -- surface electrical resistance -- 108ohms / ** extent -- enough -- ** -- although carried out, in order to prevent leakage electric field (electric-field shielding), it is necessary to form the transparency conductive layer of low resistance which are below 103ohms / ** preferably below at least 106ohms / **

[0007] Then, although some proposals are made from before in order to cope with the above-mentioned demand, the method of calcinating the coating liquid for transparency conductive layer formation which distributed the conductive particle in the solvent with inorganic binders, such as alkyl silicate, at the temperature of about 200 degrees C after spreading / desiccation to the front windshield of CRT is learned as an approach that it is low cost also in it, and low surface electrical resistance can be realized.

[0008] And the approach using this coating liquid for transparency conductive layer formation is far simple compared with the formation approach of other transparency conductive layers, such as vacuum deposition and a spatter, is low, and is a very advantageous approach as electric-field shielding which can be processed to CRT. [of a manufacturing cost]

[0009] As the above-mentioned coating liquid for transparency conductive layer formation used for this approach, what applied the indium stannic acid ghost (ITO) to the conductive particle is known. However, since the surface electrical resistance of the film obtained was as high as 104-106ohms / ** and the amendment circuit for electric-field cancellation was needed for fully covering leakage electric field, there was a problem from which the part and a manufacturing cost become comparatively high-priced. On the other hand, in the coating liquid for transparency conductive layer formation which used the metal powder for the above-mentioned conductive particle, although membranous permeability becomes low a little compared with the coating liquid which used ITO, the low resistance film 102-103ohm/** is obtained. Therefore, it is thought that it becomes advantageous in cost since the amendment circuit mentioned above becomes unnecessary, and it will become the mainstream from now on.

[0010] And it is restricted to noble metals, such as the silver and gold which cannot oxidize easily in air as a metal particle applied to the above-mentioned coating liquid for transparency conductive layer formation as shown in JP,8-77832,A, JP,9-55175,A, etc., platinum, a rhodium, and palladium. This is because an oxide film will surely be formed in the front face of metal particles, such as this, under an atmospheric-air ambient atmosphere and conductivity good as a transparency conductive layer is no longer acquired, when metal particles other than noble metals, for example, iron, nickel, cobalt, etc. are applied.

[0011] Moreover, on the other hand, in order to make the display screen legible, giving anti-glare treatment to a face panel front face, and suppressing reflection of a screen is also performed. Although made also by the approach to which prepare detailed irregularity and surface diffuse reflection is made to increase, this anti-glare treatment cannot be said as a not much desirable approach, in order that resolution may fall and image quality may fall off, when this approach is used. Therefore, it is desirable to perform anti-glare treatment with the interference method which controls the refractive index and thickness of a transparency coat so that the reflected light may produce destructive interference to incident light rather. In order to acquire a low reflection effect with such an interference method, the two-layer structure film which generally set the optical thickness of the high refractive-index film and a low refractive index film as $1/4\lambda$, $1/4\lambda$ (λ is wavelength) or $1/2\lambda$, and $1/4\lambda$, respectively is adopted, and the film which consists of the above-mentioned indium stannic acid ghost (ITO) particle is also used as this kind of high refractive-index film.

[0012] In addition, in a metal, among the parameters which constitute an optical constant (n - i_k , n :refractive index, $i_2=-1$, k : extinction coefficient), although the value of n is small, even when the transparency conductive layer which the value of k becomes from a metal particle since it is extremely large compared with ITO etc. is used, the acid-resisting effectiveness by interference of light is acquired by the two-layer structure film like ITO (high refractive-index film).

[0013] By the way, although it is limited to noble metals, such as silver, gold, platinum, a rhodium, and palladium, as a metal particle applied to the conventional coating liquid for transparency conductive layer formation as mentioned above When specific resistance, such as this, is compared, the specific resistance of platinum, a rhodium, and palladium It was more advantageous to apply a silver particle metallurgy particle by 10.6 and 5.1 or 10.8micro ohm-cm for forming the low transparency conductive layer of surface electrical resistance, since it is high compared with 1.62 or 2.2micro ohm-cm of silver and gold, respectively.

[0014] However, when a silver particle is applied, sulfuration, oxidation, and degradation by ultraviolet rays or brine are intense, the problem was in weatherability, and when another side and a golden particle were applied, although the problem of the above-mentioned weatherability was lost, it had the problem on cost like the case where a platinum particle, a rhodium particle, a palladium particle, etc. are applied. Furthermore, when a golden particle is applied, in order for the transparency conductive layer itself

formed of the optical property peculiar to gold to absorb a part of visible ray, in the screen of displays, such as CRT as which a flat transmitted-light profile is required throughout a visible ray, it had the inapplicable trouble.

[0015] this invention person replaces with the above-mentioned silver or a golden particle under such a technological background. On a silver particle front face, gold, a platinum simple substance, or the complex of gold and platinum The display with which the transparent conductive base material which used and manufactured this coating liquid in the coating liquid list for transparency conductive layer formation by which the noble-metals coat silver particle with a mean particle diameter of 1-100nm coated was distributed, and this base material were applied is already proposed (Japanese Patent Application No. No. 309350 [nine to], and Japanese Patent Application No. No. 309351 [nine to]). Refer to each specification of Japanese Patent Application No. No. 332400 [nine to], and Japanese Patent Application No. No. 332401 [nine to].

[0016] And if the front face of a silver particle is coated with gold, a platinum simple substance, or the complex of gold and platinum, since the silver inside a noble-metals coat silver particle is protected by gold, a platinum simple substance, or the complex of gold and platinum, the improvement of weatherability, chemical resistance, etc. can be aimed at.

[0017] That is, the above-mentioned transparency conductive layer in a transparent conductive base material applies the coating liquid for transparency conductive layer formation by which the noble-metals coat silver particle was distributed on a transparency substrate, and is formed by subsequently heat-treating. And by this heat-treatment, while coating of gold, a platinum simple substance, or the complex of gold and platinum had been carried out to the silver particle front face, particles combine each noble-metals coat silver particle, since the noble-metals particle which consists of gold and/or platinum, and silver is constituted respectively, the silver in a noble-metals particle is protected by gold, a platinum simple substance, or the complex of gold and platinum, and the improvement of the weatherability of the noble-metals particle in a transparency conductive layer, chemical resistance, etc. can be aimed at.

[0018] In addition, this invention person replaced the above-mentioned gold, a platinum simple substance, or the complex of gold and platinum with the approach of coating a silver particle front face, made gold, platinum, or a golden list alloy platinum and silver, and examined how to make properties, such as weatherability which made the alloy particle and was mentioned above, improve.

[0019] However, in the usual wet method adopted as particle preparation, when the water solution of chloroaurate or chloroplatinate, and silver salt is used as a raw material solution for producing the above-mentioned alloy particle, there is a problem which produces a poorly soluble silver chloride at the time of those mixing.

[0020] Moreover, although said problem is not produced when a complex cyanide is used as gold salt, platinum salts, and silver salt, there is a problem in that it is necessary to deal with poisonous cyanides, and composition of the alloy particle of gold or platinum, and silver is not easy.

[0021] Then, this invention person is aiming at solution of the trouble in the former mentioned above by the former approach using a noble-metals coat silver particle, without taking the latter approach.

[0022]

[Problem(s) to be Solved by the Invention] by the way, the heat-treatment conditions after applying the coating liquid for transparency conductive layer formation on a transparency substrate also in the former approach using a noble-metals coat silver particle -- silver [some] might be spread inside the noble-metals coat layer formed with gold and/or platinum depending on how, the alloying layer might be constituted, and the part might be exposed to the front face.

[0023] And since chemical stability was inferior compared with the noble-metals coat layer formed with gold and/or platinum, this alloying layer was remarkable as there is a problem to which that part, weatherability, ultraviolet resistance, chemical resistance, etc. fall a little and the ratio of the silver in the above-mentioned alloying layer became high especially.

[0024] This invention was made paying attention to such a problem, and the place made into the technical problem is to offer the transparent conductive base material with which weatherability,

ultraviolet resistance, etc. cannot fall easily, and its manufacture approach, even if it sets the heat-treatment conditions at the time of manufacture as arbitration.

[0025] The place made into other technical problems of this invention is to offer the coating liquid for transparency conductive layer formation applied to manufacture of the transparent conductive base material excellent in weatherability, ultraviolet resistance, conductivity, etc., and its manufacture approach.

[0026]

[Means for Solving the Problem] Namely, invention concerning claim 1 is premised on a transparency substrate and the transparent conductive base material equipped with the transparency conductive layer by which sequential formation was carried out, and a transparency coat layer on this transparency substrate. A noble-metals particle with a mean particle diameter of 1-100nm in which it consists of gold and/or platinum, and silver, and the above-mentioned transparency conductive layer exceeds 50 % of the weight, and contains gold and/or platinum in 95% of the weight of the range, Invention which is characterized by using a binder matrix as a principal component, and relates to claim 2 is characterized by containing the conductive oxide particle in the above-mentioned transparency conductive layer on the assumption that the transparent conductive base material concerning invention according to claim 1.

[0027] Moreover, invention concerning claim 3 is premised on the transparent conductive base material concerning invention according to claim 2. Invention which the above-mentioned conductive oxide particle is characterized by being one or more sorts of particles chosen from tin oxide, the tin antimonic acid ghost, or the indium stannic acid ghost, and requires it for claim 4 It is premised on the transparent conductive base material concerning invention according to claim 1 to 3. Invention which the above-mentioned binder matrix and transparency coat layer of a transparency conductive layer are characterized by using silicon oxide as a principal component, and requires them for claim 5 It is premised on the transparent conductive base material concerning invention according to claim 1 to 4. The surface electrical resistance of the above-mentioned transparency conductive layer is 10-3000ohm/**. It is characterized by the standard deviation of the permeability of only the transparency two-layer film which consists of a transparency conductive layer and a transparency coat layer, excluding the above-mentioned transparency substrate in each wavelength in every 5nm of a visible-ray wavelength region (380-780nm) being 0 - 5%.

[0028] Next, invention concerning claims 6-10 relates to invention which specified the manufacture approach of the above-mentioned transparent conductive base material.

[0029] Namely, invention concerning claim 6 is premised on the manufacture approach of a transparency substrate and the transparent conductive base material equipped with the transparency conductive layer by which sequential formation was carried out, and a transparency coat layer on this transparency substrate. A noble-metals coat silver particle with a mean particle diameter of 1-100nm which coating of gold, a platinum simple substance, or the complex of gold and platinum is carried out to a silver particle front face, and exceeds 50 % of the weight and contains gold and/or platinum in 95% of the weight of the range, and the solvent which distributes this After applying the coating liquid for transparency conductive layer formation used as a principal component on the above-mentioned transparency substrate and applying the coating liquid for transparency coat stratification subsequently, invention which is characterized by heat-treating and relates to claim 7 Invention which is characterized by containing the conductive oxide particle in the above-mentioned coating liquid for transparency conductive layer formation on the assumption that the manufacture approach of the transparent conductive base material concerning invention according to claim 6, and relates to claim 8 The above-mentioned conductive oxide particle is characterized by being one or more sorts of particles chosen from tin oxide, the tin antimonic acid ghost, or the indium stannic acid ghost a premise [the manufacture approach of the transparent conductive base material concerning invention according to claim 7].

[0030] Moreover, invention concerning claim 9 is premised on the manufacture approach of the transparent conductive base material concerning invention according to claim 6 to 8. Invention which is characterized by containing the inorganic binder which constitutes the binder matrix of a transparency conductive layer, and starts in the above-mentioned coating liquid for transparency conductive layer

formation at claim 10 It is characterized by the inorganic binder of the above-mentioned coating liquid for transparency coat stratification and the above-mentioned coating liquid for transparency conductive layer formation using the silica sol as a principal component the premise [the manufacture approach of the transparent conductive base material concerning invention according to claim 6 to 9].

[0031] Next, invention concerning claims 11-14 relates to invention which specified the coating liquid for transparency conductive layer formation used for manufacture of the above-mentioned transparent conductive base material.

[0032] Namely, invention concerning claim 11 is premised on the coating liquid for transparency conductive layer formation used for manufacture of a transparency substrate and the transparent conductive base material equipped with the transparency conductive layer by which sequential formation was carried out, and a transparency coat layer on this transparency substrate. a solvent -- and It is characterized by using as a principal component a noble-metals coat silver particle with a mean particle diameter of 1-100nm which exceeds 50 % of the weight and contains gold and/or platinum in 95% of the weight of the range while this solvent distributes and coating of gold, a platinum simple substance, or the complex of gold and platinum is carried out to the front face of a silver particle. Invention which invention concerning claim 12 is characterized by containing the conductive oxide particle on the assumption that the coating liquid for transparency conductive layer formation concerning invention according to claim 11, and relates to claim 13 It is premised on the coating liquid for transparency conductive layer formation concerning invention according to claim 12. The above-mentioned conductive oxide particle Invention which is characterized by being one or more sorts of particles chosen from tin oxide, the tin antimonic acid ghost, or the indium stannic acid ghost, and relates to claim 14 It is characterized by containing the inorganic binder on the assumption that the coating liquid for transparency conductive layer formation concerning invention according to claim 11 to 13.

[0033] Next, invention concerning claim 15 relates to invention which specified the manufacture approach of the above-mentioned coating liquid for transparency conductive layer formation.

[0034] Namely, invention concerning claim 15 is premised on the manufacture approach of the coating liquid for transparency conductive layer formation used for manufacture of a transparency substrate and the transparent conductive base material equipped with the transparency conductive layer by which sequential formation was carried out, and a transparency coat layer on this transparency substrate. While adding the aurate solution and/or platinate solution of a reducing agent and alkali metal to the colloid dispersion liquid of a silver particle or adding the mixed solution of the aurate of the above-mentioned reducing agent and alkali metal, and platinate Each blending ratio of coal of the mixed solution of the colloid dispersion liquid of a silver particle, the aurate solution of alkali metal and/or a platinate solution or the colloid dispersion liquid of a silver particle, the aurate of alkali metal, and platinate is adjusted. The noble-metals coat silver particle preparation process of obtaining the colloid dispersion liquid of the noble-metals coat silver particle which exceeds 50 % of the weight and contains gold and/or platinum in 95% of the weight of the range, Demineralization / concentration process of performing demineralization processing which lowers the electrolytic concentration in the colloid dispersion liquid of the above-mentioned noble-metals coat silver particle, and concentration processing which condenses the above-mentioned colloid dispersion liquid, and obtaining the distributed concentration liquid of a noble-metals coat silver particle, It is characterized by providing each process of solvent compounding-operation ** which adds the solvent with which solvent independence or the conductive oxide particle, and/or the inorganic binder were contained in the distributed concentration liquid of the above-mentioned noble-metals coat silver particle, and obtains the coating liquid for transparency conductive layer formation.

[0035]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained to a detail.

[0036] First, gold or platinum of this invention is chemically stable, and since it excels in weatherability, chemical resistance, oxidation resistance, etc., if the front face of a silver particle is coated with gold, a platinum simple substance, or the complex of gold and platinum, it is based on the view that the

chemical stability can be raised. Moreover, the above-mentioned transparency conductive layer applies the coating liquid for transparency conductive layer formation on a transparency substrate, as mentioned above, subsequently is heat-treated and is formed. and the case where exceeded 50 % of the weight about the content rate of the gold in the noble-metals coat silver particle contained in the coating liquid for transparency conductive layer formation, and/or platinum, and it is set as 95% of the weight of the range -- the above-mentioned heat-treatment conditions -- even if an alloying layer is formed in a part of noble-metals coat layer of how, this invention is completed based on discovery that the weatherability of the noble-metals particle obtained, ultraviolet resistance, chemical resistance, etc. cannot fall easily.

[0037] That is, this invention is characterized by using as a principal component the noble-metals particle of 1-100nm of mean diameters in which it consists of gold and/or platinum, and silver, and the above-mentioned transparency conductive layer exceeds 50 % of the weight, and contains gold and/or platinum in 95% of the weight of the range, and a binder matrix in a transparency substrate and the transparent conductive base material equipped with the transparency conductive layer by which sequential formation was carried out, and a transparency coat layer on this transparency substrate.

[0038] And it sets to this transparent conductive base material, and the weatherability of the noble-metals particle in a transparency conductive layer, ultraviolet resistance, chemical resistance, etc. are improved remarkably. For example, if the transparency conductive layer which consists of the binder matrix which uses a silver particle and silicon oxide as a principal component is immersed in brine 5%, the silver particle of the chlorine ion in brine and a transparency conductive layer will react, it will deteriorate remarkably in a short time of less than 1 hour, and even exfoliation of the film in a transparency conductive layer will be produced. On the other hand, in the case of the transparency conductive layer formed with the application of the coating liquid for transparency conductive layer formation which coating of gold, a platinum simple substance, or the complex of gold and platinum is carried out to a silver particle front face, and uses as a principal component the noble-metals coat silver particle which exceeds 50 % of the weight and contains gold and/or platinum in 95% of the weight of the range, even immersion of 24 hours or more does not change at all, but, as for a transparency conductive layer, shows the outstanding weatherability. Moreover, the noble-metals particle which exceeds 50 % of the weight and contains the gold and/or platinum which are formed in it of the above-mentioned noble-metals coat silver particle since platinum does not oxidize in a golden list in atmospheric air in 95% of the weight of the range does not have degradation of the electric resistance by oxidation resulting from the oxygen radical at the time of UV irradiation etc., either. Therefore, the oxidation resistance of the transparency conductive layer in which the noble-metals particle which exceeds 50 % of the weight and contains gold and/or platinum in 95% of the weight of the range is contained excels the transparency conductive layer in which 50 or less % of the weight of a noble-metals particle is contained in the content rate of the conventional transparency conductive layer to which the silver particle was applied as it was or gold, and/or platinum. In addition, although the content rate of gold and/or platinum is over 50 % of the weight in this invention and the weight rate of the silver in the part and a noble-metals particle is falling formally, since a rate fall when mol % compares silver atomic weight with one half extent compared with gold and platinum is not like it, either, contribution of the silver in the property of a noble-metals particle is still maintained.

[0039] Next, it is more advantageous to apply the noble-metals particle which consists of silver and gold compared with the noble-metals particle which consists of silver and platinum, or the noble-metals particle constituted from gold by silver and the platinum list, in order to make low surface electrical resistance of the above-mentioned transparency conductive layer in this invention, since the electric resistance of platinum is high a little compared with silver and gold as mentioned above. However, since the most is applied as a coating layer of the above-mentioned silver particle front face, the complex ingredient of gold, a platinum simple substance or gold, and platinum does not spoil good silver conductivity, so that it becomes below practical use level, even if the part is alloyed with silver. Therefore, in this invention, not only the noble-metals particle that consists of silver and gold but application of the noble-metals particle which consists of silver and platinum, or the noble-metals particle constituted from gold by silver and the platinum list is possible.

[0040] In addition, expressing it as a noble-metals coat silver particle about the particle which set on these specifications and consisted of silver, gold, etc. in the coating liquid for transparence conductive layer formation, and expressing in distinction from a noble-metals particle about the particle which consisted of silver, gold, etc. in a transparence conductive layer is based on the following reasons. That is, it is because the noble-metals coat layer which coats a silver particle front face by formation of an alloying layer based on the above-mentioned heat-treatment [in a transparence conductive layer] may necessarily be constituted by only gold and/or platinum to the noble-metals coat layer which sets in the coating liquid for transparence conductive layer formation, and coats a silver particle front face being constituted by only gold and/or platinum. Therefore, about the particle which consisted of silver, gold, etc. in a transparence conductive layer, it is expressed as the noble-metals particle which consists of gold and/or platinum, and silver, without expressing it as a noble-metals coat silver particle.

[0041] Here, the above-mentioned noble-metals coat silver particle requires that the mean particle diameter is 1-100nm. In the case of less than 1nm, manufacture of this particle is difficult, and is easy to condense and is not still more practical in coating liquid. Moreover, it is because surface electrical resistance becomes high too much and is not practical even when the visible-ray permeability of the formed transparence conductive layer becomes low too much, thickness is set up thinly temporarily and visible-ray permeability is made high if 100nm is exceeded. In addition, mean particle diameter here shows the mean particle diameter of the particle observed with a transmission electron microscope (TEM).

[0042] Next, in the above-mentioned noble-metals coat silver particle, the content rate of the gold which carries out the coat of the silver particle front face, a platinum simple substance or gold, and platinum complex requires exceeding 50 % of the weight and setting it as 95% of the weight of the range, and is good preferably to set up to 60 % of the weight - 90% of the weight. It is because there is difficulty in cost when some of the noble-metals coat silver particles are alloyed by heat-treatment as the amount of coatings of gold, a platinum simple substance or gold, and platinum complex is below 50 weight sections %, the protective effect of coating may become weaker, weatherability may worsen a little and 95 % of the weight is exceeded conversely.

[0043] In addition, one or more sorts of conductive oxide particles chosen from tin oxide, the tin antimonic acid ghost, or the indium stannic acid ghost into the transparence conductive layer may be added in order to aim at improvement in the film transmission in a transparence conductive layer, and film reinforcement. in this case, the compounding ratio of the noble-metals particle in a transparence conductive layer, and a conductive oxide particle -- the noble-metals particle 100 weight section -- receiving -- the conductive oxide particle 1 - the 200 weight sections -- it is good to set it as the range of the 10 - 100 weight section preferably. It is because resistance of a transparence conductive layer becomes high too much and is not practical if the effectiveness of conductive oxide particle addition will not be seen if the loadings of a conductive oxide particle are under 1 weight section, but the 200 weight sections are exceeded conversely. Moreover, the mean particle diameter of a conductive oxide particle has desirable about 1-100nm like a noble-metals particle..

[0044] Next, the coating liquid for transparence conductive layer formation used in order to form the above-mentioned transparence conductive layer can be manufactured by the following approaches.

[0045] first, known approach [, for example, Carey-Lea, -- the colloidal dispersion liquid of a silver particle is prepared by law, Am.J.Sci., 37 and 47 (1889), Am.J.Sci., and 38(1889)]. That is, after making the mixed liquor of an iron(II) sulfate water solution and a sodium-citrate water solution add and react to a silver-nitrate water solution and filtering and washing sediment, the colloidal dispersion liquid (Ag:0.1-10 % of the weight) of a silver particle is simply prepared by adding pure water. If a silver particle with a mean particle diameter of 1-100nm is distributed, the preparation approach of the colloidal dispersion liquid of this silver particle will be arbitrary, and will not be limited to this. The front face of the above-mentioned silver particle can be coated with gold, a platinum simple substance, or the complex of gold and platinum by adding a reducing agent to the colloidal dispersion liquid of the obtained silver particle, and adding the aurate solution or platinate solution of alkali metal there further, adding the platinate solution and aurate solution of alkali metal separately, or adding the mixed solution

of the platinate and the aurate of alkali metal, and the colloid dispersion liquid of a noble-metals coat silver particle can be obtained.

[0046] In addition, the little dispersant of the colloidal dispersion liquid of a silver particle, the aurate solution of alkali metal, the platinate solution of alkali metal, and the mixed solution of the aurate and platinate of alkali metal may be added to any one or each at least as occasion demands at this noble-metals coat silver particle preparation process.

[0047] That the coating reaction of the gold to a silver particle front face, a platinum simple substance or gold, and platinum complex occurs in the above-mentioned noble-metals coat silver particle preparation process here In case gold and platinum arise by reduction of an aurate and platinate, it is because a detailed silver particle already exists so much in liquid, and is because it goes on on the conditions in energy with more advantageous growing up to be the front face by using a silver particle as a nucleus rather than gold and platinum carry out a nucleation (homogeneous nucleation) independently.

Therefore, since it is premised on a detailed silver particle existing so much in liquid in case gold and platinum arise by reduction of an aurate and platinate, about the addition timing into a mixed solution and the colloidal dispersion liquid of the above-mentioned silver particle of a reducing agent, such as an aurate solution in a noble-metals coat silver particle preparation process, a platinate solution, a platinate solution and an aurate solution, or this, it is good to make it be the following. That is, it is desirable to adjust addition of mixed solutions, such as an aurate solution, a platinate solution, an aurate solution and a platinate solution, or this, and addition of a reducing agent so that a reducing agent may be added ahead of coincidence or the above-mentioned solution. In a reducing agent, an aurate solution or a platinate solution, a reducing agent, and an aurate solution list, namely, a platinate solution, Where the mixed solution of platinate is mixed with a reducing agent and an aurate list, when it adds in the colloidal dispersion liquid of a silver particle In the phase which mixed the aurate solution or the platinate solution, an aurate solution and a platinate solution, and the mixed solution of an aurate and platinate with the above-mentioned reducing agent, an aurate, In order that gold and platinum may arise by reduction of platinate and gold and platinum may carry out a nucleation (homogeneous nucleation) independently, It is because the coating reaction of the gold to a silver particle front face, a platinum simple substance or gold, and platinum complex may not occur even if it adds in the colloidal dispersion liquid of a silver particle after mixing an aurate solution, a platinate solution, etc. and a reducing agent.

[0048] In addition, although boron hydride compounds, such as a hydrazine (N_2H_4) and a sodium borohydride ($NaBH_4$), formaldehyde, etc. can be used for the above-mentioned reducing agent, if condensation of a silver ultrafine particle is not caused but an aurate and platinate can be returned to gold and platinum when added to the colloidal dispersion liquid of a silver particle, it will be arbitrary and will not be limited to these.

[0049] For example, the reduction reaction in the case of returning an auric acid potassium [$KAu(OH)_4$] and a platinic acid potassium [$K_2Pt(OH)_6$] with a hydrazine or a sodium borohydride is shown as follows, respectively.

[0050] $KAu(OH)_4 + 3/4N_2H_4 \rightarrow Au + KOH + 3H_2O + 3/4N_2**K_2Pt(OH)_6 + N_2H_4 \rightarrow Pt + 2KOH + 4H_2O + N_2**KAu(OH)_4 + 3/4NaBH_4 \rightarrow Au + KOH + 3/4NaOH + 3/4H_3BO_3 + 3/2H_2**K_2Pt(OH)_6 + NaBH_4 \rightarrow Pt + 2KOH + NaOH + H_3BO_3 + 2H_2**$ -- here Since the concentration of the electrolyte produced by the reduction reaction becomes high so that it can check from the above-mentioned reaction formula when the above-mentioned sodium borohydride is used as a reducing agent, It is easy to condense a particle so that it may mention later, and the addition as a reducing agent is restricted, and there is inconvenient [which cannot make high silver concentration in the colloidal dispersion liquid of a silver particle to be used].

[0051] On the other hand, when the above-mentioned hydrazine is used as a reducing agent, there are few electrolytes produced by the reduction reaction so that it can check from the above-mentioned reaction formula, and they are suitable as a reducing agent.

[0052] In addition, as a coating raw material of gold and platinum, when salts other than the aurate of alkali metal and the platinate of alkali metal, for example, chloroauric acid, ($HAuCl_4$), chloroplatinic acid (H_2PtCl_6) or chloroaurate ($NaAuCl_4$, $KAuCl_4$ grade), and chloroplatinate (Na_2PtCl_6 , K_2PtCl_6)

the reflection property and transmitted-light profile in a visible-ray wavelength region are improved.

[0131] (2) The reflective profile of the transparent conductive base material concerning the example 3 of a comparison shown in the reflective profile list of the transparent conductive base material which similarly is applied to the examples 1 and 2 of a comparison shown in drawing 1 at drawing 13, In the transparent conductive base material applied to examples 2, 3, and 5 so that clearly from the comparison with the reflective profile of the transparent conductive base material concerning the examples 2, 3, and 5 shown in drawing 5, drawing 7, and drawing 9, the reflection property in a visible-ray wavelength region is improved compared with the examples 1-3 of a comparison. Again The transparency profile of the transparent conductive base material concerning the example 3 of a comparison shown in the transparency profile list of the transparent conductive base material concerning the example 1 of a comparison shown in drawing 2 at drawing 14, Compared with the examples 1 and 3 of a comparison, it is a very flat transparency profile with the transparent conductive base material applied to examples 2, 3, 5, and 9 so that clearly from the comparison with the transparency profile of the transparent conductive base material concerning the examples 2, 3, 5, and 9 shown in drawing 6, drawing 8, drawing 10, and drawing 12.

[0132] That is, it is checked that the reflection property and transmitted-light profile in a visible-ray wavelength region are improved also with the transparent conductive base material concerning examples 2, 3, and 5, and the transmitted-light profile is improved in the transparent conductive base material concerning an example 9.

3. It is checked that the weatherability of the transparence two-layer film applied to each example from the result shown in Table 2 compared with the transparence two-layer film concerning the examples 1 and 3 of a comparison is also improved remarkably.

4. It is checked that the ultraviolet resistance of the transparence two-layer film furthermore applied to each example from the result shown in Table 3 compared with the transparence two-layer film concerning the example 1 of a comparison and the example 3 of a comparison is also improved remarkably.

[0133] And this thing shows that the weatherability of the transparence two-layer film concerning each example is remarkably improved compared with the former.

5. In addition, although the noble-metals coat silver particle is prepared as an aurate and platinate in examples 1-9 with the application of an auric acid potassium and a platinic acid potassium, the experiment which replaced with auric acid potassiums, such as this, and a platinic acid potassium, and applied auric acid sodium and platinic acid sodium is also conducted. And it is checking that perform the evaluation trial same also about the noble-metals coat silver particle obtained with the application of auric acid sodium and platinic acid sodium as examples 1-9, and the same evaluation is obtained.

[0134]

[Effect of the Invention] According to the transparent conductive base material concerning invention according to claim 1 to 5, the above-mentioned transparence conductive layer of the transparence two-layer film which consists of the transparence conductive layer by which sequential formation was carried out, and a transparence coat layer on a transparence substrate Since the noble-metals particle of 1-100nm of mean diameters which consist of gold and/or platinum, and silver, and exceed 50 % of the weight and contain gold and/or platinum in 95% of the weight of the range, and the binder matrix are used as the principal component, It has the acid-resisting effectiveness and the transmitted-light profile which were excellent compared with the conventional transparent conductive base material, and has good weatherability, ultraviolet resistance, and a high electric-field shielding effect.

[0135] Moreover, according to the manufacture approach of the transparent conductive base material concerning invention according to claim 6 to 10 A noble-metals coat silver particle with a mean particle diameter of 1-100nm which coating of gold, a platinum simple substance, or the complex of gold and platinum is carried out to a silver particle front face, and exceeds 50 % of the weight and contains gold and/or platinum in 95% of the weight of the range, and the solvent which distributes this Since it is heat-treating after applying the coating liquid for transparence conductive layer formation used as a principal component on the above-mentioned transparence substrate and applying the coating liquid for

transparence coat stratification subsequently, it has the effectiveness that it is low cost and the transparent conductive base material concerning claims 1-5 can be manufactured simple.

[0136] Next, according to the coating liquid for transparence conductive layer formation concerning invention according to claim 11 to 14 a solvent -- and Since the noble-metals coat silver particle with a mean particle diameter of 1-100nm which exceeds 50 % of the weight and contains gold and/or platinum in 95% of the weight of the range is used as the principal component while this solvent distributes and coating of gold, a platinum simple substance, or the complex of gold and platinum is carried out to the front face of a silver particle, As compared with the transparence conductive layer to which the conventional coating liquid for transparence conductive layer formation was applied, it has the effectiveness that it has a good acid-resisting function and an electric-field shielding function, and the transmitted-light profile in a visible-ray region, weatherability, and ultraviolet resistance can also form a good transparence conductive layer.

[0137] Moreover, according to the manufacture approach of the coating liquid for transparence conductive layer formation concerning invention according to claim 15, it has low cost and the effectiveness which can be manufactured simple for the coating liquid for transparence conductive layer formation concerning claims 11-14.

[Translation done.]

*** NOTICES ***

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- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] The transparent conductive base material characterized by using as a principal component the noble-metals particle of 1-100nm of mean diameters in which it consists of gold and/or platinum, and silver, and the above-mentioned transparence conductive layer exceeds 50 % of the weight, and contains gold and/or platinum in 95% of the weight of the range in a transparence substrate and the transparent conductive base material equipped with the transparence conductive layer by which sequential formation was carried out, and a transparence coat layer on this transparence substrate, and a binder matrix.

[Claim 2] The transparent conductive base material according to claim 1 characterized by containing the conductive oxide particle in the above-mentioned transparence conductive layer.

[Claim 3] The transparent conductive base material according to claim 2 characterized by the above-mentioned conductive oxide particles being one or more sorts of particles chosen from tin oxide, the tin antimonic acid ghost, or the indium stannic acid ghost.

[Claim 4] The transparent conductive base material according to claim 1 to 3 with which the above-mentioned binder matrix and transparence coat layer of a transparence conductive layer are characterized by using silicon oxide as a principal component.

[Claim 5] The transparent conductive base material according to claim 1 to 4 characterized by for the surface electrical resistance of the above-mentioned transparence conductive layer being 10-3000ohm/**, and the standard deviation of the permeability of only the transparence two-layer film which consists of a transparence conductive layer and a transparence coat layer, excluding the above-mentioned transparence substrate in each wavelength in every 5nm of a visible-ray wavelength region (380-780nm) being 0 - 5%.

[Claim 6] In the manufacture approach of a transparence substrate and the transparent conductive base material equipped with the transparence conductive layer by which sequential formation was carried out, and a transparence coat layer on this transparence substrate A noble-metals coat silver particle with a mean particle diameter of 1-100nm which coating of gold, a platinum simple substance, or the complex of gold and platinum is carried out to a silver particle front face, and exceeds 50 % of the weight and contains gold and/or platinum in 95% of the weight of the range, and the solvent which distributes this The manufacture approach of the transparent conductive base material characterized by heat-treating after applying the coating liquid for transparence conductive layer formation used as a principal component on the above-mentioned transparence substrate and applying the coating liquid for transparence coat stratification subsequently.

[Claim 7] The manufacture approach of the transparent conductive base material according to claim 6 characterized by containing the conductive oxide particle in the above-mentioned coating liquid for transparence conductive layer formation.

[Claim 8] The manufacture approach of the transparent conductive base material according to claim 7 characterized by the above-mentioned conductive oxide particles being one or more sorts of particles chosen from tin oxide, the tin antimonic acid ghost, or the indium stannic acid ghost.

[Claim 9] The manufacture approach of the transparent conductive base material according to claim 6 to

8 characterized by containing the inorganic binder which constitutes the binder matrix of a transparency conductive layer in the above-mentioned coating liquid for transparency conductive layer formation.

[Claim 10] The manufacture approach of the transparent conductive base material according to claim 6 to 9 characterized by the inorganic binder of the above-mentioned coating liquid for transparency coat stratification and the above-mentioned coating liquid for transparency conductive layer formation using the silica sol as a principal component.

[Claim 11] In the coating liquid for transparency conductive layer formation used for manufacture of a transparency substrate and the transparent conductive base material equipped with the transparency conductive layer by which sequential formation was carried out, and a transparency coat layer on this transparency substrate a solvent -- and While this solvent distributes and coating of gold, a platinum simple substance, or the complex of gold and platinum is carried out to the front face of a silver particle Coating liquid for transparency conductive layer formation characterized by using as a principal component a noble-metals coat silver particle with a mean particle diameter of 1-100nm which exceeds 50 % of the weight and contains gold and/or platinum in 95% of the weight of the range.

[Claim 12] Coating liquid for transparency conductive layer formation according to claim 11 characterized by containing the conductive oxide particle.

[Claim 13] Coating liquid for transparency conductive layer formation according to claim 12 characterized by the above-mentioned conductive oxide particles being one or more sorts of particles chosen from tin oxide, the tin antimonic acid ghost, or the indium stannic acid ghost.

[Claim 14] Coating liquid for transparency conductive layer formation according to claim 11 to 13, characterized by containing the inorganic binder.

[Claim 15] In the manufacture approach of the coating liquid for transparency conductive layer formation used for manufacture of a transparency substrate and the transparent conductive base material equipped with the transparency conductive layer by which sequential formation was carried out, and a transparency coat layer on this transparency substrate While adding the aurate solution and/or platinate solution of a reducing agent and alkali metal to the colloid dispersion liquid of a silver particle or adding the mixed solution of the aurate of the above-mentioned reducing agent and alkali metal, and platinate Each blending ratio of coal of the mixed solution of the colloid dispersion liquid of a silver particle, the aurate solution of alkali metal and/or a platinate solution or the colloid dispersion liquid of a silver particle, the aurate of alkali metal, and platinate is adjusted. The noble-metals coat silver particle preparation process of obtaining the colloid dispersion liquid of the noble-metals coat silver particle which exceeds 50 % of the weight and contains gold and/or platinum in 95% of the weight of the range, Demineralization / concentration process of performing demineralization processing which lowers the electrolytic concentration in the colloid dispersion liquid of the above-mentioned noble-metals coat silver particle, and concentration processing which condenses the above-mentioned colloid dispersion liquid, and obtaining the distributed concentration liquid of a noble-metals coat silver particle, The manufacture approach of the coating liquid for transparency conductive layer formation characterized by providing each process of solvent compounding-operation ** which adds the solvent with which solvent independence or the conductive oxide particle, and/or the inorganic binder were contained in the distributed concentration liquid of the above-mentioned noble-metals coat silver particle, and obtains the coating liquid for transparency conductive layer formation.

[Translation done.]